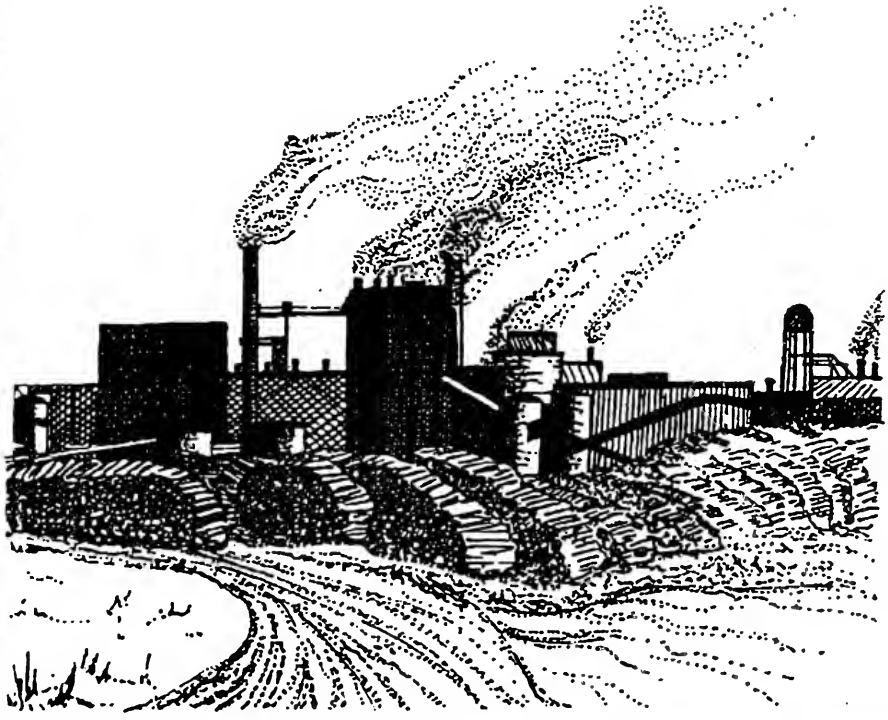
SNOW SAMPLING SURVEY

near

GRANT FOREST PRODUCTS CORP.,

ENGLEHART, 1994.



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ENGLEHART, 1994

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EXECUTIVE SUMMARY

SNOW SAMPLING SURVEY NEAR GRANT FOREST PRODUCTS CORP., ENGLEHART, 1994.

Grant Forest Products Corporation operates an oriented strandboard plant in the Town of Englehart. The company has a long standing history of complaints involving air emissions from the plant. The complaints relate to odour, blue haze and particulate.

The Ministry of Environment and Energy carried out snow sampling studies in 1991 and 1992 in order to investigate the particulate complaints. The 1991 survey was carried out while the plant was not operating whereas the 1992 survey was performed when the plant was operating. In the resulting report, entitled "Snow Sampling Surveys in the vicinity of Grant Forest Products, Englehart, 1991-92", a 1992 increase in fallout of contaminants, notably wood particulate, were attributed to operations at Grant Forest Products.

The present report draws the following conclusions from data collected in 1994 as well as in 1991 and 1992. In 1994 there was a slight decrease in particulate carbon and a slight increase in suspended, dissolved solids and chloride compared with 1992. Levels of most parameters were significantly higher than 1991 levels, when the plant was not operating. Fallout significantly elevated above Ministry contaminant guidelines in 1994 was confined to company property with dustfall not exceeding the Ontario objective off company property. Nevertheless, there were 22 exceedences of contaminant guidelines off company property in 1994, compared with 23 in 1992 and one in 1991. Statistical analysis indicated that the contaminants all originate from a common emission source. However, due to an insufficient number of sites at increasing distances from the mill, there was a weak correlation between most contaminant levels and distance from the Grant Forest Products' mill.

Because the 1994 snow sampling survey was somewhat inconclusive, a follow-up survey is to be performed.

INTRODUCTION

In response to complaints regarding fallout of particulate matter around a plant owned by Grant Forest Products Corporation of Englehart, the Ministry of Environment and Energy carried out snow sampling studies in 1991 and 1992.[1] Grant Forest Products produces 400 tonnes per day of waferboard and 800 tonnes per day of oriented strandboard. The 1991 survey was carried out while the plant was not operating. Samples collected at sites around the mill in 1991 revealed contaminant levels similar to control sites remote from the plant. The 1992 survey, when the mill was operating, revealed a significant increase in the fallout of contaminants, notably wood particulate, from 1991. This increase was attributed to operations at Grant Forest Products.

This technical memorandum presents data from a follow-up survey in 1994, carried out in response to ongoing complaints from nearby residents and an increase in mill production rates. Results from this work are compared with data from previous years. The data also serves as a future comparison, as the mill is presently adding a single-pass dryer to replace the triple-pass dryer on one of the process lines.

METHODS

Single samples of snow were collected on February 1, 1994, from each of nine sites around the waferboard plant (Figure 1), and from one control site remote from the study area. Snow meltwater samples were submitted to the Ministry's Toronto laboratory for analysis of carbon (dissolved organic carbon, dissolved inorganic carbon and total particulate carbon), solids (suspended solids, dissolved solids and total solids), as well as calcium, chloride, phosphorus, conductivity and pH. These parameters were selected because they are airborne contaminants often associated with emissions from forest products industries.

Standard Ministry procedures were followed in the collection and processing of snow samples.[2] Contaminant guidelines developed by the Ministry were used to interpret the data.[3] These guidelines are based on the upper limit of normal concentrations of selected parameters in snow in Ontario. Values above guidelines may indicate contamination problems. Exceedences do not violate Ministry regulations, nor do they necessarily imply health or environmental effects.

RESULTS AND DISCUSSION

Results from the 1994 snow sampling survey are summarized in Table 1, together with data from 1991 and 1992. The data indicate a small decrease from 1992 to 1994 in carbon, calcium, phosphorous, conductivity and dissolved solids. Chloride, suspended solids and total solids were slightly higher in 1994 than in 1992. There were 22 exceedences of contaminant guidelines off company property in 1994, compared with 23 in 1992 (plant operating) and one in 1991 (plant not operating). (The 1994 exceedence figure does not include the eight exceedences at site 9, which was added to this survey because of the numerous complaints in this area.) Figure 2 illustrates the change in suspended solids levels over the three study periods. A similar pattern was observed for levels of total solids.

Correlation matrices between selected parameters and distance from Grant Forest Products are presented in Table 2. The strong positive relationship between most contaminants suggests that these parameters are associated with a common source. However, relationships are weak between most contaminants and distance from the mill. An insufficient number of sites at increasing distances from the mill probably explains the poor correlations.

The deposition rates of carbon and solids were calculated. According to data from the Earlton weather station, snow was on the ground for 56 days prior to the 1991 sampling date. The comparable periods for the 1992 and 1994 surveys were 64 days and 52 days, respectively. Deposition rates are summarized in Table 3. These data show that the off-property fallout levels were well below Ontario's maximum acceptable limit of 7 $g/m^2/30$ days.

CONCLUSIONS AND RECOMMENDATIONS

A snow sampling survey carried out near Grant Forest Products Corp. in 1994 revealed elevated contaminant levels at most sites near company property. There was a slight decrease in particulate carbon and a slight increase in suspended and dissolved solids compared with 1992. Levels of most parameters were significantly higher than 1991 levels, when the plant was not operating. Fallout significantly elevated above Ministry contaminant guidelines in 1994 was confined to company property. Expressed as dustfall, deposition of material emitted from Grant Forest Products did not exceed the Ontario objective off company property. Statistical analysis indicated that the contaminants all originate from a common emission source.

Because the 1994 snow sampling survey was somewhat inconclusive, a follow-up survey is scheduled for February, 1995. This survey will provide better area coverage of nearby residential areas and reassess the impact of mill emissions.

ACKNOWLEDGEMENTS

We acknowledge with thanks the assistance of a student from the Sault College of Applied Arts and Technology co-operative education program in carrying out the snow sampling survey in 1994. In addition, the field work done by the staff of the Sudbury Regional MOEE office is acknowledged.

REFERENCES

1. Negusanti, J.J. 1993. Snow sampling surveys in the vicinity of Grant Forest Products, Englehart, 1991-1992. Ontario Ministry of Environment and Energy.

2. Ontario Ministry of the Environment. 1993. Field Investigation Manual. Phytotoxicology Section, Hazardous Contaminants Branch, Report No. 014-3511-93.

3. Ontario Ministry of the Environment. 1989. Ontario Ministry of the Environment "Upper Limit of Normal" Contaminant Guidelines for Phytotoxicology Samples. Phytotoxicology Section, Air Resources Branch.

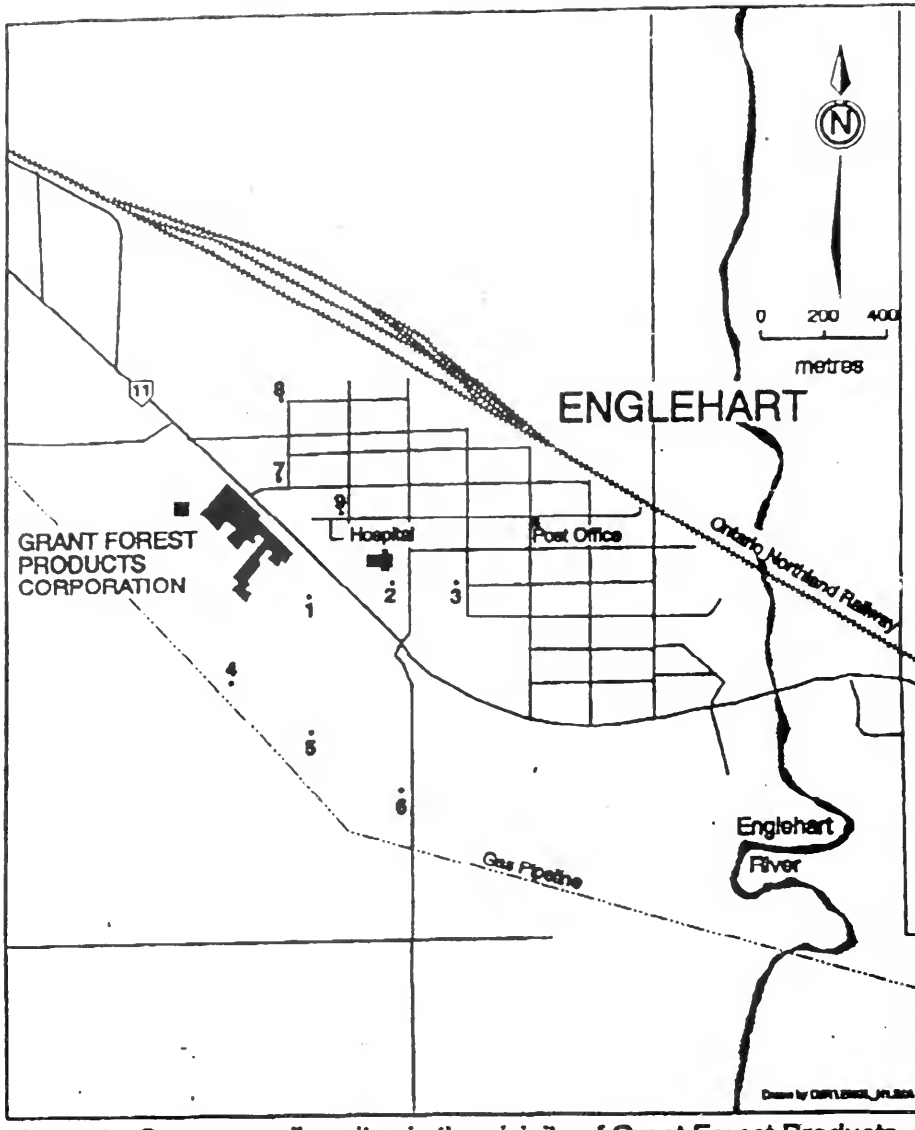

Figure 1. Snow sampling sites in the vicinity of Grant Forest Products Corp., Englehart, 1991-92, 1994.

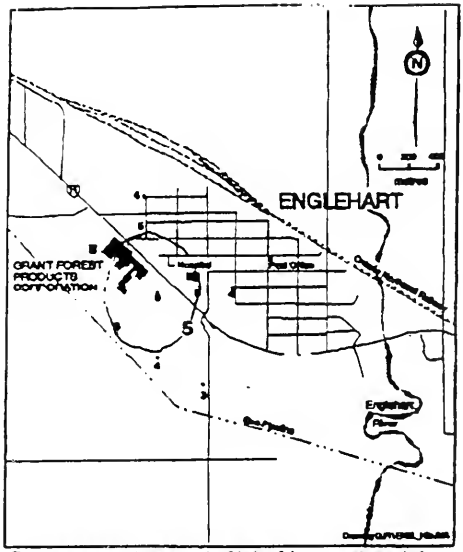

Figure 2a. Levels of suspended solids (mg/l) in snow meltwater in the vicinity of Grant Forest Products Corp., Englehart, 1991.

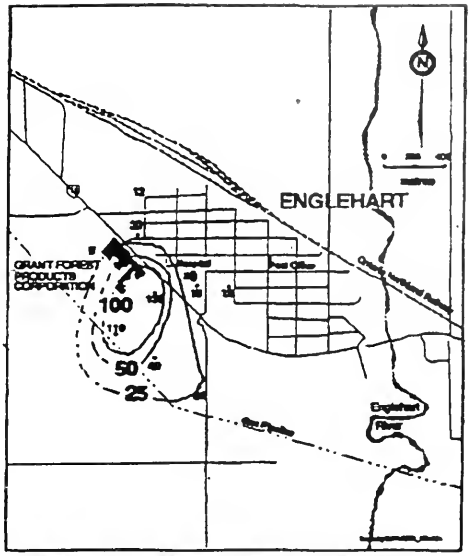

Figure 2b. Levels of suspended solids (mg/l) in snow meltwater in the vicinity of Grant Forest Products Corp., Englehart, 1992.

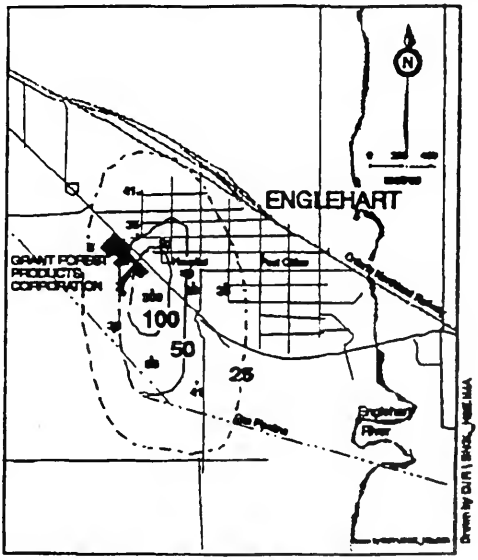

Figure 2c. Levels of suspended solids (mg/l) in snow meltwater in the vicinity of Grant Forest Products Corp., Englehart, 1994.

Table 1. **Comparison between levels of contaminants (mg/l, except conductivity - μmhos/cm) in snow collected near Grant Forest Products, Englehart, in 1991, 1992 and 1994.**

										Solids								
	Particulate Carbon			DIC[a]			DOC[a]			RSP[a]			RSF[a]			RST[a]		
Site	1991	1992	1994	1991	1992	1994	1991	1992	1994	1991	1992	1994	1991	1992	1994	1991	1992	1994
1[b]	8.2[c]	29	29	1.1	13.2	4.4	0.6	9.9	6.6	9	130	198	<2	94	100	11	220	300
2	0.8	4	2	<0.2	3.4	1.8	0.5	2.5	0.8	5	18	26	10	33	25	15	51	50
3	0.7	2	3	<0.2	1.6	1.0	0.9	1.4	0.4	4	12	28	2	22	12	7	34	41
4[b]	0.5	28	9	<0.2	6.4	2.0	0.6	4.2	0.9	5	110	38	<2	45	13	7	160	51
5[b]	0.8	11	9	<0.2	5.6	2.6	0.5	4.1	1.0	4	40	58	<2	39	20	6	79	77
6	0.4	11	4	<0.2	3.4	2.2	0.8	1.9	1.0	3	24	41	<2	27	20	5	51	61
7	0.8	6	3	<0.2	3.8	2.6	0.6	2.0	0.7	5	20	35	9	35	40	14	55	75
8	0.6	5	1	<0.2	1.8	1.8	0.6	1.0	0.6	4	12	41	<2	19	16	6	31	57
9			6			2.0			1.8			91			43			130
Mean[d]	1.6	12	7	0.2	4.9	2.3	0.6	3.4	1.5	5	46	62	4	39	32	9	85	94
Controls	0.6	1.5	1.1	<0.2	<0.2	0.2	0.4	0.6	0.4	2	5	4	<2	7	7	4	11	10
Guidelines		7.0			1.0			2.0			25			30			40	

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Table 1. Continued...

Site	Calcium			Chloride			Phosphorus			Conductivity			pH		
	1991	1992	1994	1991	1992	1994	1991	1992	1994	1991	1992	1994	1991	1992	1994
1[b]	0.4	19.0	1.4	3.0	3.9	4.8	0.01	0.95	1.30	36	140	130		10.1	10.6
2	0.3	5.7	3.3		2.6	3.8	0.01	0.24	0.12	43	51	35		9.0	9.2
3	0.2	2.7	1.6	3.8	2.6	0.9	0.01	0.21	0.11	30	34	16		7.7	7.6
4[b]	0.1	9.1	2.2	0.7	0.8	0.2	0.004	0.68	0.14	19	69	19		9.4	7.0
5[b]	0.1	8.5	4.0	0.8	0.6	0.2	0.004	0.29	0.25	20	61	27		9.7	8.9
6	0.1	5.4	3.6	1.7	0.8	0.6	0.003	0.19	0.15	22	41	28		9.0	8.9
7	0.3	6.1	6.4	5.2	2.9	9.1	0.01	0.27	0.43	39	54	51		9.0	9.4
8	0.1	3.4	2.9	0.9	0.8	0.8	0.006	0.14	0.13	19	29	22		8.4	8.6
9			6.2			6.7			0.44			55			10.0
Mean[d]	0.2	5.4	3.5		1.9	3.0	0.007	0.37	0.34	29	60	43		9.0	8.9
Controls	0.1	0.2	0.4	0.2	0.6	0.3	0.004	0.08	0.01	21	11	11		4.7	4.4
Guidelines		2.0			4.0			0.15			45				

[a]DIC - dissolved inorganic carbon, DOC - dissolved organic carbon, RSP - suspended solids, RSF - dissolved solids, RST - total solids.
[b]Sites on company property.
[c]Values exceeding contaminant guidelines are underlined.
[d]Means do not include control sites.

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1991

	DIC	DOC	PTC	RSF	RSP	RST	CA	CL	P	COND25
DOC	NA	–								
PTC	0.96[a]	-0.21	–							
RSF	-0.27	-0.18	-0.09	–						
RSP	0.83	-0.38	0.89	0.06	–					
RST	0.29	-0.47	0.45	0.79	0.63	–				
CA	0.61	-0.10	0.72	0.58	0.72	0.84	–			
CL	0.29	0.46	0.36	0.75	0.26	0.65	0.81	–		
P	0.35	-0.04	0.52	0.66	0.55	0.76	0.88	0.77	–	
COND25	0.31	-0.16	0.45	0.82	0.51	0.91	0.93	0.93	0.83	–
DIST	-0.16	0.50	-0.26	-0.35	-0.32	0.53	-0.32	-0.13	-0.46	-0.33

1992

	DIC	DOC	PTC	RSF	RSP	RST	CA	CL	P	COND25	pH
DOC	0.97	–									
PTC	0.87	0.80	–								
RSF	0.97	0.97	0.77	–							
RSP	0.93	0.92	0.95	0.88	–						
RST	0.96	0.95	0.91	0.94	0.99	–					
CA	0.99	0.96	0.86	0.97	0.91	0.95	–				
CL	0.14	0.21	-0.22	0.36	-0.01	0.13	0.16	–			
P	0.89	0.92	0.81	0.93	0.94	0.97	0.88	0.29	–		
COND25	0.90	0.92	0.73	0.97	0.83	0.89	0.92	0.43	0.89	–	
pH	0.95	0.88	0.83	0.87	0.84	0.86	0.96	-0.04	0.73	0.78	–
DIST	-0.04	0.08	0.08	-0.09	0.07	0.01	-0.09	-0.30	-0.03	-0.13	-0.09

1994

	DIC	DOC	PTC	RSF	RSP	RST	CA	CL	P	COND25	pH
DOC	0.82	–									
PTC	0.66	0.82	–								
RSF	0.79	0.86	0.56	–							
RSP	0.74	0.94	0.81	0.79	–						
RST	0.81	0.95	0.75	0.92	0.96	–					
CA	0.07	-0.19	-0.32	0.09	-0.16	-0.56	–				
CL	0.26	0.36	-0.03	0.75	0.29	0.50	0.33	–			
P	0.82	0.85	0.71	0.94	0.87	0.95	0.05	0.57	–		
COND25	0.78	0.91	0.68	0.95	0.85	0.94	-0.21	0.60	0.92	–	
pH	0.68	0.72	0.32	0.91	0.69	0.82	0.29	0.74	0.79	0.79	–
DIST	-0.28	-0.16	0.19	-0.45	-0.19	-0.32	-0.37	-0.62	-0.39	-0.32	-0.42

[a] Underlined numbers indicate a significant relationship at the 95% level. Concentrations of all parameters except conductivity and pH were log transformed before correlations were calculated.

Table 3. **Deposition levels[a] of carbon and solids (g/m^2/30 days) in snow collected near Grant Forest Products Corp., 1991, 1992, 1994.**

	PARTICULATE CARBON			SOLIDS								
				DISSOLVED			SUSPENDED			TOTAL		
SITE	1991	1994	1994	1991	1992	1994	1991	1992	1994	1991	1992	1994
1[b]	0.3	0.9	1.2	<.1	3.0	4.0	0.3	4.0	7.8[c]	0.4	7.0	11.8
2	<.1	0.1	<:1	0.2	1.1	0.7	<.1	0.6	0.7	<.1	1.7	1.4
3	<.1	0.1	0.1	<.1	0.7	0.5	<.1	0.4	1.2	<.1	1.1	1.7
4[b]		1.2	0.2		1.9	0.3		4.6	0.9		6.4	1.3
5[b]		0.2	0.6		0.8	1.3		0.8	3.9		1.6	5.3
6		0.3	0.1		0.8	0.5		0.7	1.0		1.4	1.5
7		0.1	0.1		0.8	2.1		0.4	1.8		1.2	3.9
8		0.1	<.1		0.4	0.9		0.2	2.2		0.6	3.1
10			0.2			1.6			3.3			4.9
Mean	0.1	0.4	0.3	0.1	1.2	1.3	0.1	1.5	2.5	0.1	2.6	3.9
Control		0.1	<.1		0.3	<.1		0.2	<.1		0.5	<.1

[a] Deposition rates were calculated using the following equation:

$$d = \frac{cV}{n\pi r^2 T} \times 30$$

where

d = deposition level (g/m^2/30 days)
c = concentration (mg/l)
V = snow meltwater volume (l)
n = number of cores
r = radius of the sampler (7.62 cm)
T = deposition time (days)

[b] Sites on company property.

[c] Values exceeding the Ontario air quality objective of 7.0 g/m^2/30 days are underlined.

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